CCNPP3COLA PEmails

From: Arora, Surinder
Sent: Saturday, March 20, 2010 12:42 PM
To: 'Poche, Robert'; 'cc3project@constellation.com'
Cc: CCNPP3COL Resource; Karas, Rebecca; Stieve, Alice; Colaccino, Joseph; Steckel, James; Biggins, James; Vrahoretis, Susan; Hair, Christopher
Subject: FINAL RAI 219 RGS2 4162
Attachments: FINAL RAI 219 RGS2 4162.doc

Rob,

Attached please find the subject request for additional information (RAI). The draft of this RAI was sent to you on March 1, 2010. Per request from UniStar a clarification phone call on the draft RAI was held on March 9, 2010, however, no changes to the draft questions resulted from this phone call.

The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a schedule date for submitting your technically correct and complete response will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the review schedule.

Your response letter should also include a statement confirming that the response does or does not contain any sensitive or proprietary information.

Thanks.

SURINDER ARORA, PE
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Sent Date: 3/20/2010 12:42:09 PM
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From: Arora, Surinder

Created By: Surinder.Arora@nrc.gov

Recipients:
"CCNPP3COL Resource" <CCNPP3COL.Resource@nrc.gov>
Tracking Status: None
"Karas, Rebecca" <Rebecca.Karas@nrc.gov>
Tracking Status: None
"Stieve, Alice" <Alice.Stieve@nrc.gov>
Tracking Status: None
"Colaccino, Joseph" <Joseph.Colaccino@nrc.gov>
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"Vrahoretis, Susan" <Susan.Vrahoretis@nrc.gov>
Tracking Status: None
"Hair, Christopher" <Christopher.Hair@nrc.gov>
Tracking Status:: Response: None : 2/23/2010 11:38:00 AM
"'Poche, Robert'" <Robert.Poche@constellation.com>
Tracking Status: None
"'cc3project@constellation.com'" <cc3project@constellation.com>
Tracking Status: None

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Options
Priority: Standard
Return Notification: No
Reply Requested: Yes
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Request for Additional Information No. 219 (eRAI 4162)

3/19/2010

Calvert Cliffs Unit 3
UniStar
Docket No. 52-016
SRP Section: 02.05.01 - Basic Geologic and Seismic Information
Application Section: 2.5.1

QUESTIONS for Geosciences and Geotechnical Engineering Branch 2 (RGS2)

02.05.01-63

In FSAR section 2.5.1.1.4 "Regional Tectonic Setting", the global review of earthquakes in SCRs based on Johnston, et al (1994) evaluation of 870 earthquakes in SCRs was cited and discussed. In RAI 02.05.01-3 the NRC staff pointed out that the FSAR does not include the analysis of Schulte and Mooney, (2005), a significant rework and analysis of the same issue with respect to earthquakes in SCRs that post-dates the Johnston et al (1994) study and which also includes 503 additional earthquakes. NRC asked the applicant to provide a discussion of the relevance of the Schulte and Mooney, (2005), paper for the CCNPP site. In response to RAI 02.05.01-3 the applicant provided a discussion of both the Johnston, et al and the Schulte & Mooney papers stating that the Schulte and Mooney, 2005 conclusions are essentially the same as the Johnston et al, 1994 and did not contradict any of the Johnston, et al conclusions. The applicant stated that the Schulte and Mooney paper does not provide new information that motivates revisions to the EPRI-SOG source characterizations used for CCNPP.

NRC specifically requested a discussion of the Schulte and Mooney 2005 work as part of the characterization of the CCNPP site Regional Tectonic setting. Regardless of several similar conclusions to the earlier work, the Schulte Mooney paper presents a different perspective of study in that it presents the geological or tectonic relationship or association with seismicity as well as adding an additional 503 earthquakes to the overall evaluation. Please explain why you plan no future revision to FSAR to include a discussion of this study.

02.05.01-64

FSAR Section 2.5.1.1.4, Regional Tectonic Setting, cites the Crone and Wheeler compiled database of Quaternary structures or features with potential seismogenic properties as the basis for the statement that there is no evidence for late Cenozoic seismogenic activity on any feature in the CCNPP region. In response to RAI 02.05.01-4 the applicant provided a detailed process of what they did to evaluate potential Quaternary faults and features near the site beyond the scope of the Crone and Wheeler compilation. The applicant described a multistep process that included: compilation and review of existing published and unpublished literature; phone and in-person interviews of regional and local experts (they provided a specific list of scientists); field and aerial reconnaissance, and review of aerial photography (5-mile radius), digital elevation maps, and LiDAR coverage.

Since Crone (2000) and Wheeler (2005) did not do the detailed field work described in the RAI response to evaluate the Quaternary features near the site, please explain

why a summary of this important response is not planned to be integrated into a future revision of the FSAR.

02.05.01-65

In FSAR Section 2.5.1.1.4.4.3, Mesozoic Tectonic Structures, you stated that there is no association of specific Mz basin bounding faults with demonstrable, associated seismicity or evidence of recent fault activity. In RAI 02.05.01-17 the NRC staff asked the applicant to provide a combined map of basins, boundary faults and depth coded epicenters to justify this assertion. The applicant provided a revised figure and stated that this illustrates that there is a low level of seismic activity within the 200 mile radius of CCNPP and the pattern of seismicity (earthquake magnitude, distribution and depth) is similar to the early EPRI distribution/catalog. No new large EQ associated with Mz basins are in the CCNPP region.

NRC staff notes that the revised figure shows epicenters clustered SE of traces of the Newark and Richmond basins northwestern boundary faults. In addition, the revised figure provided by you shows zero depths for nearly all the EQs, which precludes knowing if they occurred on the MZ faults or not. Zero km is not usually taken as a fixed depth for poorly located EQs. Please discuss the accuracy of the earthquake locations with respect to the basin and basin bounding faults and implications for recent interpretations of earthquakes below the basin in Precambrian rock.

02.05.01-66

FSAR, Section 2.5.1.1.4.4.4.5, Hillville fault zone, refers to seismic reflection data to support the presence of the Hillville fault, within 5 miles of CCNPP. In RAI 02.05.01-18, the NRC staff asked for a copy of the seismic line St-M-1 and asked about the fault possibly being captured in the extensive marine seismic data taken in the Chesapeake Bay, to the east of the land-based seismic reflection line.

You responded by providing a segment of the seismic reflection line and an enlarged figure of the LiDAR data. You stated that the fault is seen on the St M-1 seismic reflection data but was not interpreted on the marine seismic reflection in the Chesapeake Bay. The fault is projected to the NW (placing it west, southwest of CCNPP) based on coincidence with an aeromagnetic anomaly. In addition, a structure contour map published by the MD Geological Survey does not show offset on a regional recognized stratigraphic marker, the top of the Piney Point-Nanjemoy Aquifer.

In your response, you stated that you plan no change to the FSAR. Please justify why the response figures and associated discussions should not be a part of the revised FSAR.

02.05.01-67

In RAI 2.5.1-19 and -48, NRC staff asked for additional information about an unnamed fault in the northern portion of the Chesapeake Bay interpreted by Dr. F. Pazzaglia (Pazzaglia, 1993a, 1993b, 2006)(FSAR Section 2.5.1.1.4.4.4.6). You indicated that there was little evidence to support the existence of any fault.

With regard to your RAI response, please address the following issues:

- Older Coastal Plain units more widely exposed and mapped on the SE side of fault (up thrown side) than on the NW side.
- The LiDAR surface map provided in your response is inconclusive because an 8 m elevation difference across the fault would not show in Figure 6 at the scale presented. Furthermore, locating a fault that is "coming ashore" would require examination all along the coast line at a large scale resolution (close in detail). Pazzaglia's dotted line is an approximation of the location of his interpreted fault. This also applies to examination of the bay bathymetry.
- You argue that lack of elevation data for the base of the TP beds precludes corroborating Pazzaglia's 8 m offset. Pazzaglia made his correlation based on the elevation differences of more than one distinct unconformity in Coastal Plain units, both exposed and buried (examined in a trench dug into the Coudon Farm terrace, ~ 3m deep).
- Contrary to your asertion that soil profiles do not correlate across the bay, Pazzaglia does not attempt to correlate the soils located at Coudon's Farm terrace with Turkey Point soils. This is not the basis of his fault interpretation.
- The marine seismic reflection data disclosing paleochannels of the Susquehanna River does not cover the specific area under discussion. However, you pointed out that there are paleochannel segments that are straight. This does not require that the straight eastern Chesapeake Bay coastline must be non-tectonic in origin.
- Susquehanna River channel takes a sharp turn to the south at it's mouth or the head of the bay. This is also supported by the series of submarine paleochannels.
- The bathymetric profile across the bay in Figure 4 indicates a smooth profile but the scale of presentation does not permit close examination of the profile. The offshore location of the fault could be located just off shore from Turkey Point, in the thalweg channel of the Susquehanna River. Newell at al, 2004 interpreted recent river/deltaic deposits along the base of the bay, almost as far south as Annapolis. These deposits could mask a small surface expression of a submarine fault.
- Sea Cliffs on west-facing shorelines of the Elk Neck and Delmarva Peninsulas, along with all streams draining east indicating a tilted block.
- The argument that there have not been subsequent, independent studies to Pazzaglia's does not in itself rule out a fault interpretation.
- In response to RAI 48 b, Part 2, the applicant described the distinction between Higgins' and Pazzaglia's geologic mapping. Higgins's map (Figure 5a) is an earlier interpretation that does not necessarily refute Pazzaglia's interpretation. NRC staff note that the differences are mostly a matter of breaking out subunits from formerly undifferentiated upland gravel deposits or reinterpreting an informal unit into a distinct stratigraphic formation. Southeast of fault, Pazzaglia breaks out additional units, Bryn Mawr and Perryville Fm, from Higgins' undifferentiated Upland Gravel unit. Northwest of fault, Pazzaglia reinterprets Higgins' Upland gravel as Pensauken Fm.

Please provide a discussion about this potential fault that addresses the above issues.

02.05.01-68

FSAR Sections 2.5.1.1.4.4.5.4 Ramapo Fault system and 2.5.1.1.4.4.5.5 Kingston Fault cite Figure 2.5-31 when discussing the Ramapo, Kingston and New York Bight faults

which indicates these faults as circled numbers. In RAI 02.05.01-24 NRC staff asked the applicant to provide a figure that shows the fault lines and map relations that are described in the text. In response the applicant provided 4 additional maps. You also indicated that there would be no change to the FSAR.

NRC staff note that the discussions in the original FSAR about these faults cannot be understood without additional illustrations/maps beyond Figure 2.5-31. The map and cross section of the Kingston fault is needed to understand the uncertainty of the interpretation of a fault in the first place. It is difficult to understand the general geologic setting and relative position of these faults to each other as well. Please explain why you do not plan to include a more illustrative map/figure to support the text.

02.05.01-69

FSAR section 2.5.1.2.6.4 states that "There is no evidence of earthquake-induced liquefaction in the State of Maryland" and cited the Crone and Wheeler papers. In RAI 02.05.01-28 NRC staff pointed out that the Crone and Wheeler database does not support that statement and asked if potential liquefaction features had been investigated as part of the geologic investigation for the site. NRC staff also requested you provide details of any such survey. In RAI 02.05.01-30, NRC staff asked you to provide liquefaction information for the site area along with methods used and a summary of the findings.

In response, you indicated that the investigation for potential liquefaction features done for this COL application included a literature review, discussions with subject matter experts, an aerial and field reconnaissance, and a review of aerial photography. You stated that based on this work there is no liquefaction within 25 miles of CCNPP and within the state of MD. You planned no revision to the FSAR.

NRC staff note that the original statement citing Crone and Wheeler as the basis of the conclusion that there is no earthquake induced liquefaction in the state of MD remains in the FSAR and does not actually support that conclusion.

a. Dr. Martitia Tuttle is a regional expert in paleoliquefaction. Please explain if you reviewed Tuttle publications about potential paleoliquefaction within the state of MD.

b. In figure 4 of the response to this question is an oblique aerial photo of a terrace along the Potomac River. There are two circular features in the foreground that appear as sand blow deposits. Please discuss the origin of these circular features.

c. Please explain why the response to this question is not to be included in a future FSAR revision.